

1. Content of the 'Topic Description' document

1.1. Topic area

Forest, trees, tree health, detection.

1.2. Topic title

Multi-lure and multi-trap surveillance for invasive tree pests.

1.3. Description of the problem the research should solve

Early detection methods for invasive tree pests are critical for the eradication and management of these species. If invasive tree pests are not detected at or shortly after arrival, they can rapidly become established and spread. This leads to long term damage of trees and increased tree mortality, either due to damage caused by the pest or through the introduction of pathogenic organisms (fungi, bacteria, viruses, nematodes) for which many invasive tree pests may also be vectors. This impacts heavily on the ecosystem services provided by trees, and can also have significant health implications (such as with oak processionary moth). There will also be economic, social and environmental costs associated with long-term management strategies and actions which will have to be adopted if strategies to exclude or rapidly detect and eradicate such pests are unsuccessful.

There are many potential high risk sites including ports of entry as well as importers (e.g. high risk commodities such as penjing, bonsai and wooden furniture), stone merchants and timber merchants and different pest risks depending on native climate and woodland species. All of this makes the detection of different tree pests a rather complex process. The primary objective is to extend, to other EU member countries, the multi-species surveillance techniques for alien wood-boring beetles (Scolytinae, Cerambycidae, Buprestidae) recently completed for Italian ports under EU seventh framework (FP7) project Q-DETECT (see Rassati et al., 2015; 2015¹). The aim is to provide research outputs, background data and better techniques for the improved detection of invasive pests of trees across all member states.

The project will focus primarily on high-risk, high-threat wood-boring species, e.g.; asian and citrus longhorn beetles (*Anoplophora glabripennis*, *Anoplophora chinensis*), emerald ash borer (EAB) and bronze birch borer (BBB) (*Agilus plannipennis* and *Agilus anxius* respectively), sawyer beetles, such as black pine sawyer (*Monochamus galloprovincialis*), Scolytinae ambrosia and bark beetles (various *Ips* spp.) such as eight-toothed spruce bark beetle (*Ips amitinus*), and various weevils, such as *Hylobius* species. This project could perhaps also be extended to include lepidopteran pests (e.g. oak processionary and pine processionary moths, *Thaumetopoea* spp.).

Key questions to be addressed by the research would include:

- a) What traps and lures are already available, including host volatile lures, pheromone lures?
- b) What are the efficiencies of different lures / traps for each invasive species? Are there lures that attract more than one invasive species?
- c) How can we best monitor for multiple pest species most efficiently?
- d) What is the cost / benefit analysis of multiplex (multi-trap, multi-lure blends) detection of multiple species versus a more targeted approach to individual species?
- e) What are the constraints on multiplex trapping of invasive species at high risk sites (e.g. access, security, suitable locations etc.)?

¹ Rassati et al. (2014) Trapping wood boring beetles in Italian ports: a pilot study. *J. Pesticide Science*, 87: 61-69.

Rassati et al. (2015) Improving the early detection of alien wood-boring beetles in ports and surrounding forests. *J. Applied Ecology*, 52: 50-58.

- f) To what extent can remote monitoring (e.g. smart traps, cameras) replace the need for costly and labour intensive staff inputs?

The project will draw on expertise in countries outside the EU already dealing with the key tree health pest invasive species (e.g. USA, China and Russia) and will inform policy-making at national and EU levels. More specifically, it will have links to or build upon various other projects:

ANOPLORISK: Euphresco-funded transnational project, involving Austria, Belgium, Denmark, Italy, The Netherlands and United Kingdom, focusing on the detection and risk management of *Anoplophora* (Asian longhorn beetle)

ANOPLORISK: Euphresco-funded transnational follow-on project to ANOPLORISK, involving Austria, Germany and United Kingdom

Q-DETECT: an FP7 KBBE interdisciplinary project to develop quarantine pest detection methods for use by national plant protection organisation (NPPO) and inspection services

MONOCHAMUS: Euphresco-funded transnational project, involving Belgium, Denmark, The Netherlands, Portugal and Slovenia, focusing on the detection, optimization of trapping, lures and risk management of *Monochamus* vectors of pine wood nematode (*Bursaphelenchus xylophilus*)

REFRAME: an EU FP7 KBBE project for the development of improved methods for detection, control and eradication of pine wood nematode in support of EU Plant Health policy

OBSERVATREE LIFE+: an EU funded project which is developing an early warning system to rapidly identify new pest and disease outbreaks. This Euphresco topic will complement that work to provide a wide ranging and comprehensive approach to protecting the health of forests, woodlands and trees.

1.4. Description of the expected results

Lures will be developed, deployed and assessed to effectively trap these invasive species and allow early detection by deployment at high risk sites. Interdisciplinary research will be carried out on the development, logistics and cost-benefit analysis of multi-species lure and trapping of invasive tree pests at ports of entry and high risk sites. This will also include assessing the variability of lures and determining whether minimum standards should be set. Improved detection of multiple tree pests, including Buprestidae (EAB, BBB), Cerambycidae (ALB, CLB, Pine Sawyer), Scolytinae (bark and ambrosia beetles) and weevils (*Hylobius* species), as well as Thaumetopoeidae (OPM, PPM) by incorporating visual and olfactory cues, as well as trap design (e.g. UV-light) to maximise multiplex trapping of invasive tree pests. Smart traps, automatic systems for collecting images via cameras remotely will also be investigated.

1.5. Beneficiaries of this research product

Stakeholders who will benefit from the research include National and EU policy makers, National Plant Protection Services, including plant health inspectorates, evidence and analysis specialists, also forest, woodland and tree managers, nursery managers, scientists, importers, members of the public and other stakeholders.

1.6. Euphresco members with proposal for content contribution/ distribution

The project is set out in three workpackages:

Workpackage 1 – Scoping Study

Identify and review currently available traps and lures including host volatile lures and pheromone lures to determine their efficiency, cost, ease of use and monitoring etc.

Assess whether there are any lures that attract more than one invasive species and as above review their efficiency, cost, ease of use and monitoring etc.

Workpackage 2 – Multiplex Lures and Traps

Determine the best combination of lures and traps to capture the target pest species (individually or grouped) with the highest efficiency.

Asses the optimal and minimum density of traps/lures required for efficient monitoring of the target pest species.

Consider the cost / benefit analysis of multiplex (multi-trap, multi-lure blends) detection of multiple species versus a more targeted approach to individual species.

Assess the constraints on multiplex trapping of invasive species at high risk sites (e.g. access, security, suitable locations, etc).

Workpackage 3 – Remote Monitoring

Review current remote monitoring approaches and assess to what extent remote monitoring (e.g. smart traps, cameras) can replace the need for costly and labour intensive staff inputs.

Member	Proposed research component
1. Department for Environment, Food & Rural Affairs, Great Britain Elspeth Steel elspeth.steel@defra.gsi.gov.uk	-Participate in the 3 workpackages Contact person: Elspeth Steel elspeth.steel@defra.gsi.gov.uk Contact person: Belinda Phillipson belinda.phillipson@defra.gsi.gov.uk
2. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Austria Elfriede Fuhrmann Elfriede.fuhrmann@bmlfuw.gv.at	-Participate in the 3 workpackages Contact person: Gernot Hoch gernot.hoch@bfw.gv.at
3. Canadian Food Inspection Agency, Canada Philip MacDonald Philip.Macdonald@inspection.gc.ca	-Contribution to be detailed Contact person: Troy Kimoto Troy.Kimoto@inspection.gc.ca
4. Nederlandse Voedsel-en Warenautoriteit, The Netherlands Martijn Schenk M.Schenk1@nvwa.nl	-Participate in the 3 workpackages Contact person: Antoon Loomans a.j.m.loomans@nvwa.nl
5. Instituto Nacional de Investigação Agrária e Veterinária, I.P., Portugal Maria Leonor Cruz leonor.cruz@iniav.pt	-Participate in the 3 workpackages Contact person: Edmundo Sousa edmundo.sousa@iniav.pt
6. United States Department of Agriculture, Animal and Plant Health Inspection Service, United States of America Laurene Levy Laurene.Levy@aphis.usda.gov	-Field test trap and lure combinations. -Coordinate projects to develop and evaluate wood borer survey methods (cooperative agreements). -Catalog available traps and attractants. Contact person: Joe Francese Joe.Francese@aphis.usda.gov -Identify novel pheromone and host attractants for wood borers

	Contact person: Damon Crook Damon.J.Crook@aphis.usda.gov
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1.7. Non-Euphresco members with proposal for content contribution/ distribution

Member	Proposed research component
7. Canadian Forest Service, Canada Jeremy Allison jeremy.allison@canada.ca	-Expert advisor Contact person: Jeremy Allison jeremy.allison@canada.ca

1.8. Research project partnership outside Euphresco

Euphresco funding ensures a certain level of transnational collaboration among Euphresco member countries. It is possible, if the funding consortium is interested, to contact funding organisations or research groups outside the geographical area covered by Euphresco members. The Euphresco coordinator could advertise the research topic in order to have an enlarged collaboration. If funders are interested in this possibility, please check the case below:

The funding consortium of the topic mentioned in section 1.2 requires advertising the topic outside the Euphresco network

Information to sharpen the profile of sought partners could be useful (but not mandatory): country/region (if there are preferences), skills/expertise required, etc.

1.9. Any other relevant information on content

Work related to this topic was already funded under Anoplorisk I and II and therefore duplication should be avoided.

2. Euphresco management aspects of the project

2.1. Indication of the topic budget

Member ^a	Mechanism ^b	Total Budget ^c
1. DEFRA (GB)	NC	€ 160.000
2. BMLFUW (AT)	VP	€ 19.000
3. CFIA (CA)	NC	€ 43.000
4. NVWA (NL)	NC	€ 12.000
5. INIAV I.P. (PT)	NC	€ 5.000
6. APHIS (US)	NC	€
7. CFS (CA)		€
total		€

2.2. Expected duration of the project (only for non-competitive topics)

24 months.

2.3. Any other relevant information on topic organisation and management

^a First member is project coordinator. A minimum of two partners are necessary for each proposal. Add lines as needed.

^b Please indicate the preferred mechanism (e.g. real pot RP; virtual pot VP; non-competitive NC), or several mechanisms if there is flexibility.

^c Optional, as this amount can still change in the next phase. In-kind contribution should also be indicated in this column.